

Estimating Emissions in Latin America: An Alternative to Traffic Models

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Emissions from traffic are a serious pollution problem in Latin American cities. Traffic models at street level allow precise estimations of these emissions but are too expensive for a broad application. A simplified approach for estimating traffic emissions at city level proved to be a reasonable alternative for Latin American mid-sized cities.



Figure 1: Air pollution and related traffic emissions in Bogotá, Colombia (C. Misteli, left, and M. Ossés, right).

Current situation

Many Latin American cities have serious pollution problems due to traffic emissions (Figure 1). These emissions can be most accurately estimated at street level with traffic models. However, most Latin American cities cannot afford such a sophisticated approach.

Proposed solution

A simplified approach was developed for estimating traffic emissions at city level. This approach applies the same emission factors as traffic models, but uses a more simplified procedure for mileage estimation (Figure 2). The method was tested on 16 mid-sized Chilean cities. The resulting emission estimates were compared with reference values from traffic models.

Results and conclusions

In all cities evaluated, the estimated emissions of HC, NO_x, NH₃, N₂O and CH₄ were within ±30% of the reference value and in most cities the accuracy was even higher (Figure 3). For PM₁₀ and CO, the estimates were less accurate.

The uncertainties of the estimated emissions (calculated with a Monte Carlo simulation) were about ±80% to about ±120%, depending on the pollutant. The main source of uncertainty in the simplified approach for emission estimation lies in the emission factors and to a lesser extent in the mileage. Moreover, the models apply the same emission factors. Thus their results also show great uncertainties.

Therefore we conclude that the simplified approach is a useful option for a first screening of traffic emissions in Latin American mid-sized cities similar to those evaluated here.

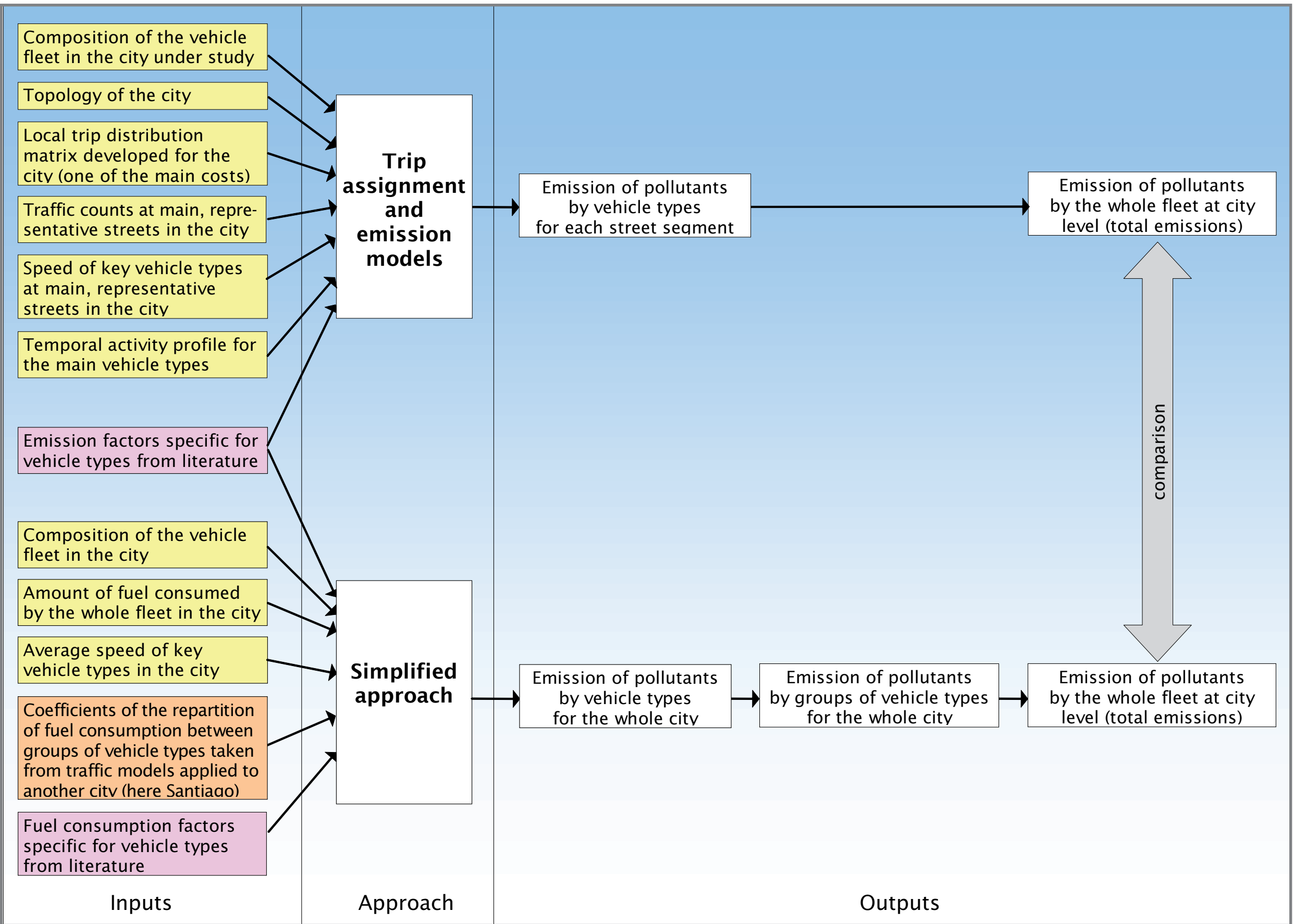


Figure 2: Schematic representation of the estimation of traffic emissions with traffic models and with the proposed simplified approach. The inputs required by both approaches are presented, as are the outputs applied for comparison. Local data is presented in yellow, generic data in pink and data taken from another city in orange.

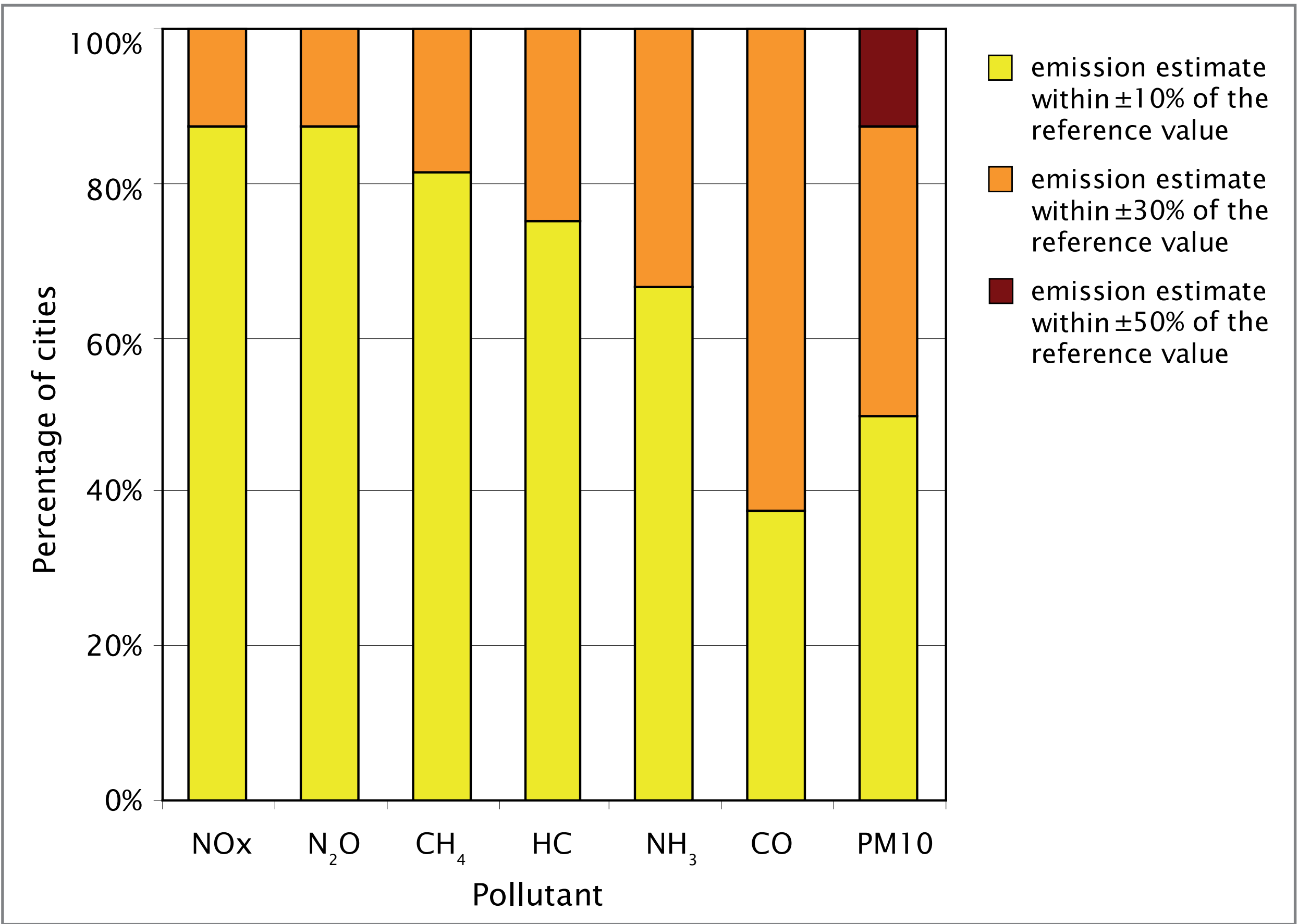


Figure 3: Accuracy of emissions estimated with the simplified approach. The percentages indicated refer to cities where the estimates fulfilled accuracy criteria. These accuracy criteria are based on relative difference with respect to the reference values delivered by traffic models.